DOCUMENT RESUME

ED 074 388 CG 007 854

AUTHOR Thrash, Susan K.; Hapkiewicz, Walter G.
TITLE Student Characteristics Associated with Success in a Mastery Learning Strategy.
PUB DATE Feb 73
NOTE 9p.; Paper presented at the American Educational Research Association Conference (New Orleans, Louisiana, February 25-March 1, 1973)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *College Students; Females; Graduate Students; Learning Activities; *Learning Processes; *Learning Theories; Males; Measurement Instruments; Research Projects; *Student Characteristics; Student Reaction; *Students
IDENTIFIERS Mastery Learning

ABSTRACT

This paper examines student characteristics associated with success in a mastery learning strategy by: (1) continually assessing over terms the entry and exit skills of the students enrolled and (2) constructing and validating a scale for measurement in the affective domain. The mastery learning theory itself was proposed by Bloom (1968) as a method of individualized instruction. Subjects for the study were graduate and undergraduate students in educational psychology who progressed through a series of six units requiring mastery tests upon completion. While preassessment data showed substantial individual differences among students' knowledge of educational psychology, mastery learning theory suggests that such student differences may simply mean that different amounts of time are required to learn a task. Analysis of the data reveals that males generally reacted more favorably than females to the mastery learning technique and also that graduate students, who were primarily practicing teachers, rated the course less favorably than did undergraduate students. (Author/SES)

Paper presented at the meeting of the American Educational Research Association, New Orleans, 1973.

Student Characteristics Associated With Success in a Mastery Learning Strategy

Susan K. Thrash and Walter C. Hapkiewicz

Michigan State University

"Individualized instruction" is an avowed goal of many educators. Instructional elements necessary to achieve this goal often include: specification of educational objectives, instruction compatible to student needs and abilities, student-paced learning, and continuous feedback and reinforcement of student responses. One instructional strategy consistent with the goals of individualized instruction is Bloom's (1968) proposal for "mastery learning." The strategies developed from Bloom's theory have generally been shown to result in superior learning outcomes when compared to more traditional lecture-examination approaches (see studies reviewed by Block, 1971). The available evidence suggests that students not only learn more but rate such teaching strategies considerably higher than other modes of instruction. However, there have been very few attempts to identify particular student characteristics associated with success in mastery learning strategies. Furthermore, while some investigators have reported very positive student ratings when using this strategy these ratings do not appear to be based on a scale specifically validated for this purpose. Therefore, the purpose of the present investigation was to examine student characteristics associated with success in a mastery learning strategy by: 1) continually assessing over terms the entry and exit skills of the students enrolled and; 2) constructing and validating a scale for measurement in the affective domain.

Method

Course Procedures

During the first class meeting of each term all students completed a pre-

test which was constructed to measure essentially the same objectives as the final examination. The students were told that a score of 85% or higher meant that they were eligible to take the final exam immediately and receive course credit by examination. Answers to the pre-test were distributed during the next class meeting and students were urged to retain both test and answers to use as sample study items for the final examination.

The course was organized as follows: (1) the course material was divided into 10 units; (2) instructional objectives accompanied each unit of material; (3) two to three parallel forms of mastery tests, ranging from 10 to 15 points each, were available for 6 of the 10 units (these tests contained both short answer and multiple choice items); (4) the other four units consisted of projects (e.g. writing behavioral objectives, sequencing instruction...); (5) before attempting any of the six mastery tests the student was required to interview (discuss the material) with another student; (6) the mastery tests were graded mastery (80% above) or nonmastery (below 80%) and did not affect the student's grade; (7) the projects were continuously revised until acceptable (a grade of "A" was then assigned and constituted 50% of the student's grade); (8) the final examination constitiuted the remaining 50% of the student's grade; (9) the final and the attitude scale were administered at the completion of the course; (10) students progressed through the course at their own pace and; (11) 20% of the available class time was used to provide lectures. Class size ranged from 80 to 120 students over the four terms in which the study was conducted.

The following procedure is typical of the manner in which students progressed through the six units which required mastery tests. Upon completion of his study of each unit the student participated in an interview with another student. The purpose of the interview was to give the student practice in discussing the material and to aid in diagnosing difficulties before the mastery

test was attempted. The instructional staff included the instructor, graduate assistants, and proctors (the student staff ratio was approximately nine to one). They were available to answer questions before the student attempted a mastery test (the various forms of the tests were administered randomly). Proctors graded mastery tests immediately after they were completed by the student, and provided remedial discussion of points misunderstood. At this point the student was eligible to move on to the next unit (if mastery was attained) or to take the alternate form of the test (if mastery was not attained).

A separate record was kept for each student, which included the following (1) the signature of the student's interviewer for each test; (2) the date each test was attempted; (3) the form of each test attempted; (4) the student's score on each test; and (5) progress toward completion of the projects. All records were kept by the graduate assistants. Since these procedures were conducted during class time the instructor was available to discuss problems wtih students on an individual basis.

Scale Development

The scale used to measure the affective domain was a Likert-type scale. It was constructed and tested over three successive terms and administered in the fourth term to 46 students elected at random. The final scale consisted of 22 of the most discriminating items which attempted to measure the student's attitude toward the mastery learning strategy (see Table 2). A high score on the scale represents a positive attitude toward the course. An equivalent forms reliability of the scale was computed to be .61. An internal consistency coefficient, using Hoyt's method, was computed to be .87 with standard error of measurement of 4.315.

Results and Discussion

Cognitive domain

Our preassessment data repeatedly revealed that there were substantial

individual differences among students with regard to their knowledge of educational psychology. However, mastery learning theory suggests that such student differences (aptitudes) simply mean that different amounts of time are required to learn a task to criterion. If this is true, such preassessment data might be used to predict the amount of time needed to learn but would be a poor predictor of exit performance. The latter proved to be the case; the preassessment and final tests correlated .26 over 3 successive terms indicating the pretest accounted less than 7% of the variance in final examination scores. Furthermore, while there was considerable variability within each class one class performed about 10 percentage points lower on the pre-test than did the others. However, the final examination performance of all classes was practically identical (X = 33 out of 43 items; S.D. = 4.1; KR-20 = .65).

Affective domain

Subjects were categorized by class level and sex. The number of subjects within each group appears in Table 1.

	Undergraduates	Graduates
Males	3	13
Females	12	18

Table 1. Number of subjects within groups

It was found that although most students rated the course favorably (see Tables 3 and 4)there were significant differences among groups. In particular a multivariate analysis of variance revealed that both main-effects of the 2x2 (student level x sex) analysis were significant. With respect to the sex differences, males generally reacted more favorably than females (F = 3.5, df = 22, 21, p < .003). On individual items, males were more likely to report that: 1) their interest in psychology had increased (p < .03); 2) they were satisifed

with what they had learned ($p < .03$); 3) they saw practical application to their own work ($p < .03$);and 4) their anxiety decreased as they progressed through the course ($p < .06$). Examination of the mean ratings indicated that the anxiety level of the females may have increased somewhat during the course, which may account for why they were generally more uncomfortable with the strategies than males.

In examining the differences between graduate and undergraduate students a very consistent pattern emerged. Graduate students, who were primarily practicing teachers, rated the course less favorably than undergraduate students ($F = 2.1$, $df = 22, 21$, $p < .05$). Items accounting for the significant curriculum level main effect were practically non-overlapping with those items contributing to the sex main effect. While females seemed to rate items dealing with general feeling toward the course lower than males, they did not differ on those items pertaining to aspects of course organization or course structure. In examining the univariate F-ratios for items contributing to the overall effect it was found that graduates preferred courses to be taught in a more traditional manner ($p < .01$), were more likely to complain about the work load ($p < .03$), and were more critical about the time spent in mastery testing ($p < .03$). In spite of their interest in "individualized instruction" which might include such variables as "immediate knowledge of results" and "working at your own rate", these course characteristics were rated significantly lower by graduates than undergraduates ($p < .01$ and $p < .004$ respectively). This was somewhat surprising in that most of the graduates were practicing teachers. This may possibly be due to the fact that undergraduates found that the opportunity to repeat mastery tests reduced their test anxiety to a greater extent than did the graduates ($p < .005$). Another possiblility is that the graduate students, having more teaching experience, were less enthusiastic about the mastery learning strategy because they were more aware of organizational and managerial problems that they would

encounter should they attempt to implement such a strategy. Simply maintaining records of student progress would probably require a teacher aide. A third alternative is that graduates, having been involved in the "lecture-test" educational system longer than undergraduates expect more of the same. This is supported by the fact that the former students preferred courses taught in a more traditional manner ($p < .01$) with less time spent on mastery testing ($p < .003$) and more time spent on lectures ($p < .03$).

It is, of course, possible that the best explanation involves some combination of the three alternatives suggested, or, some other unspecified factor. It does appear that attempts to individualize instruction should retain at least some of the elements of traditional course work, such as frequent lecture presentations, which most students appear to expect.

References

Block, J. H. Mastery learning: Theory and practice.

Bloom, B. S. Learning for mastery. UCLA-CSEIP Evaluation Comment, 1, No.2, 1968.

TABLE 2

1. I would prefer my other courses to be taught as this course is taught.
2. There is too much concern in this course for practical applications.
3. I like the immediate feedback.
4. All teachers should learn more about the topics taught in this course.
5. It seems as if I do a lot of waiting in this course.
6. I prefer my courses to be taught in a more traditional manner.
7. I was less anxious about the quizzes because I could repeat them.
8. I feel that more lectures are needed on the material in the texts.
9. I am satisfied with my knowledge of the material in this course.
10. There is too much work in this course.
11. After taking a quiz, I appreciate being able to discuss it with one of the assistants.
12. I like being able to work at my own rate.
13. This course has practical applications in my work.
14. I feel that in a class like this the final exam should not be a determining factor in the final grade.
15. I like being graded for myself not on the basis of other people.
16. My anxiety decreased as the course progressed.
17. I study too much for this course.
18. The quizzes are too short to cover the subject matter adequately.
19. My attitude toward Educational Psychology has changed favorably because of this course.
20. I would like to learn more about Educational Psychology.
21. I feel that I have learned more because this course was taught in the Mastery fashion.
22. Too much time is spent in taking quizzes.

TABLE 3

	MALES		FEMALES		UNIVARIATE*	
Item#	MEAN	(S.D.)	MEAN	(S.D.)	F	p<
1	3.56	(1.36)	2.73	(1.41)	3.7733	0.0589
2	3.81	(1.17)	3.93	(.94)	0.1387	0.7115
3	4.69	(.48)	4.47	(.63)	1.7499	0.1931
4	4.19	(.75)	3.63	(1.10)	3.2990	0.0765
5	3.63	(1.09)	3.87	(.94)	0.7894	0.3794
6	3.69	(1.45)	3.60	(1.13)	0.0572	0.8122
7	3.38	(1.26)	3.63	(1.30)	0.5495	0.4627
8	3.13	(1.26)	2.90	(1.40)	0.3233	0.5727
9	4.13	(.81)	3.40	(1.13)	5.3402	0.0259
10	3.75	(.68)	3.37	(1.03)	1.9293	0.1722
11	4.38	(1.02)	4.00	(.83)	1.9098	0.1743
12	4.50	(.82)	4.17	(.70)	2.4629	0.1241
13	4.31	(1.01)	3.60	(1.00)	4.9851	0.0310
14	2.44	(1.15)	2.13	(1.11)	0.7570	0.3893
15	3.94	(.85)	4.17	(1.09)	0.5939	0.4453
16	3.38	(1.20)	2.70	(1.12)	3.4800	0.0692
17	2.81	(1.11)	3.57	(1.01)	5.3033	0.0264
18	3.06	(1.12)	3.83	(.91)	6.7447	0.0130
19	3.50	(.97)	2.87	(.90)	4.8261	0.0337
20	4.06	(.68)	3.33	(1.03)	6.2219	0.0167
21	3.88	(.88)	3.40	(1.19)	1.9643	0.1685
22	3.44	(1.21)	3.30	(1.09)	0.1814	0.6724

*degrees of freedom for hypotheses = 1, degrees of freedom for error = 42.

TABLE 4

	UNDERGRADUATES		GRADUATES		UNIVARIATE*	
Item#	MEANS	(S.D)	MEANS	(S.D.)	F	p<
1	3.40	(1.50)	2.84	(1.39)	3.0800	0.0866
2	3.93	(.96)	3.87	(1.06)	0.0124	0.9119
3	4.80	(.41)	4.42	(.62)	6.7130	0.0132
4	3.87	(.92)	3.81	(1.08)	0.3607	0.5514
5	4.47	(.52)	3.45	(.99)	12.7110	0.0010
6	4.27	(.70)	3.32	(1.33)	7.0458	0.0112
7	4.47	(.52)	3.10	(1.30)	14.4292	0.0005
8	3.53	(1.51)	2.71	(1.19)	4.9449	0.0317
9	3.87	(1.06)	3.55	(1.09)	2.3520	0.1327
10	3.87	(.83)	3.32	(.94)	5.2643	0.0269
11	4.40	(.63)	4.00	(1.00)	3.2093	0.0805
12	4.67	(.49)	4.10	(.79)	9.3127	0.0040
13	3.73	(.96)	3.90	(1.11)	0.0018	0.9660
14	1.93	(.80)	2.39	(1.23)	1.2454	0.2708
15	4.40	(.91)	3.94	(1.03)	1.9717	0.1677
16	3.00	(1.20)	2.90	(1.19)	0.4652	0.4990
17	3.60	(1.06)	3.16	(1.10)	0.7076	0.4051
18	4.07	(.80)	3.32	(1.08)	3.8135	0.0576
19	3.13	(.92)	3.06	(1.00)	0.5276	0.4717
20	3.40	(.91)	3.68	(1.01)	0.1641	0.6875
21	3.73	(.96)	3.48	(1.18)	1.1064	0.2989
22	4.00	(.85)	3.03	(1.11)	9.7103	0.0033

*degrees of freedom for hypotheses = 1, degrees of freedom for error = 42